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Investigating Changes in Weight of College Freshmen in the Pacific Northwest: A Pilot Study

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Investigating Changes in Weight of College Freshmen in the Pacific Northwest: A Pilot Study

Abstract
This study investigated changes in weight in college freshmen at a small university in the Pacific Northwest. A growing body of literature has investigated the recent phenomenon that college students may be vulnerable to a rapid weight gain that could predispose them to a number of unhealthy consequences. The purpose of this study was to investigate the prevalence of any weight gain in college freshman and any factors that might be associated with this finding such as physical activity levels, caloric intake, and the use of healthy campus options available to students. The results indicated that a substantial weight gain was not found, but students tended to, on average, gain more than what was expected for a typical adult given the time frame. Other contributing factors could not be determined from this study. Possible intervention strategies are cited in an effort to improve upon future research in this area.

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INVESTIGATING CHANGES IN WEIGHT OF COLLEGE FRESHMEN IN THE
PACIFIC NORTHWEST:
A PILOT STUDY

A THESIS
SUBMITTED TO THE FACULTY
OF
SCHOOL OF PROFESSIONAL PSYCHOLOGY
PACIFIC UNIVERSITY
HILLSBORO, OREGON

BY
MEGAN PHILLIPS

IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE
OF
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APPROVED:

Dr. Daniel Munoz, PhD
Abstract

This study investigated changes in weight in college freshmen at a small university in the Pacific Northwest. A growing body of literature has investigated the recent phenomenon that college students may be vulnerable to a rapid weight gain that could predispose them to a number of unhealthy consequences. The purpose of this study was to investigate the prevalence of any weight gain in college freshman and any factors that might be associated with this finding such as physical activity levels, caloric intake, and the use of healthy campus options available to students. The results indicated that a substantial weight gain was not found, but students tended to, on average, gain more than what was expected for a typical adult given the time frame. Other contributing factors could not be determined from this study. Possible intervention strategies are cited in an effort to improve upon future research in this area.

Key Words:

Weight gain
Eating behaviors
Freshman Year
Freshman 15
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Figure 6: Ending weight distributions for the different ages sampled.
Investigating Changes in Weight of College Freshmen in the Pacific Northwest: A Pilot Study

The prevalence of obesity and overweight has rapidly increased since the 1980s, and current numbers indicate that over one billion adults worldwide are overweight and 300 million of those are obese (WHO, 2006). Obesity and overweight are often caused by the consumption of foods high in energy but low in nutrition and a decrease in physical activity (Centers for Disease Control and Prevention, 2009). Obesity and overweight can pose serious health consequences in afflicted adults that can include Type 2 diabetes, cardiovascular disease, hypertension, stroke, and even some forms of cancer (Centers for Disease Control and Prevention, 2009). In addition to medical consequences, being obese or overweight can have serious mental health consequences as well. Some of the mental health struggles associated with being overweight include negative body image, depression, and suicidal ideation (Pawlik-Kienlen, 2007). The negative consequences of obesity and overweight are severe, and some researchers indicate that certain populations are at an increased risk (Cole-Peralta, 2007).

On average, a typical adult in the U.S. will gain approximately one to two pounds per year. This equates to approximately 100 extra calories consumed each day. However, some researchers identify young adults aged 18-29 as the cohort that is at the greatest risk for new cases of overweight and obesity (Cole-Peralta, 2007). This is likely caused by a sedentary lifestyle that is common amongst this age group that may not place a great emphasis on physical activity. Also the weight gain trend for this age group may be disproportionately affecting college aged individuals (Anderson, Shapiro, & Lundgren, 2003). A typical research finding and related media report is that the freshman year of
college holds the greatest potential for rapid weight gain, and sources such as magazines and newspapers have coined this trend the “freshman 15’ (Brown, 2008). Such a rapid weight gain in such a short amount of time could be contributing to rising overweight and obesity rates in the U.S. and could be setting current college students up for many chronic medical and mental health problems in the future (Cole-Peralta, 2007). The purpose of the present study is to investigate the occurrence of weight gain among college freshman in the Pacific Northwest and to identify related factors that may be associated with this phenomenon. The hope is that this research will facilitate future intervention strategies that can be specifically targeted at this at risk population.

Over the past 20 years, the incidence of overweight and obesity has increased dramatically (Centers for Disease Control and Prevention, 2009). Currently, more than 30 states in the U.S. have an obesity rate that is equal to or greater than 25% of the population, and three of these states had obesity rates that exceed 30%. This number has increased from 1970s data in which obesity rates were at approximately 15% (National Health and Nutrition Examination Survey, 2000). Overweight and obesity are calculated using a measurement of one’s body mass index (BMI) which is the person’s weight in kilograms divided by the square of their height in meters. For adults, a BMI over 25 kg/m² is defined as overweight, and a BMI of over 30 kg/m² is considered to be obese. Severe obesity is defined as being over 40 kg/m². The average adult in North America has a BMI of between 25 and 27 kg/m² which indicates that more than half of the adult population is overweight (2000).

Researchers have shown that as a person’s weight increases to the point of becoming overweight or obese, the risk for a number of serious medical conditions also
increases. Some of the potential health consequences are coronary heart disease, Type 2 diabetes, certain types of cancers (endometrial and colon), hypertension, stroke, liver disease, sleep apnea, and osteoarthritis (National Health and Nutrition Examination Survey, 2000). These could lead to premature death or serious chronic conditions that severely limit one’s quality of life (Elmer, Brown, Nichols, & Oster, 2004). Even a small weight gain can lead to increased risk for chronic diseases like heart disease. The consequences can also be economic. In total, obesity and overweight account for approximately 7% of health care costs in the United States (Elmer, Brown, Nichols, & Oster, 2004). In 1995, obesity costs were approximately $99 billion, and in 2000, that number increased to $117 billion. Researchers have indicated that more rapid weight gain of 20 pounds or more can lead to greater annual medical costs over a three year period (Elmer, Brown, Nichols, & Oster, 2004). Also, these consequences affect women far more often than men due to societal norms of attractiveness (Pawlik-Keinlen, 2007). Obesity and overweight can also lead to social discrimination due to negative stereotypes and can ultimately lead to increased rates of anxiety, depression, suicidal ideation, and lowered self-esteem (2007).

There are many factors that contribute to rising overweight and obesity rates in the U.S. Although genes play an important role, many environmental influences can also put a person at risk. The World Health Organization (2006) reports that poor food choices that contain items high in fats and sugars and low in nutritional value as well as societal norms that have shifted the focus away from physical activity have largely contributed to rising obesity rates. Some researchers have indicated that overweight and obesity rates have also disproportionately affected young adults aged 18 to 29, and more specifically
this effect has been shown to occur within college environments (Anderson, Shapiro, and Lundgren, 2003). Some potential causes that are often cited to explain this phenomenon are poor food choices, large meal plans, increased alcohol intake, decreased activity level, and on-campus residency (Kasperek, Corwin, Valois, Sargent, & Morris, 2008).

This rapid weight gain that has been shown to affect college students has been termed the “freshman 15” within the media and college campus environments to reflect the belief that students will gain a substantial amount of weight during this small period of time (Brown, 2008). In one study, a librarian (Brown, 2008) conducted a Google search of “freshman 15” in 2007 which led to 162,000 website hits, and less than 1% of these referenced actual research studies. This finding indicates that the “freshman 15” has been largely discussed within the media but has not been satisfactorily investigated within the literature. In response to this, several researchers have begun to examine the purported freshman weight gain that could reach a total of 15 pounds in one year.

Some researchers who have investigated the “freshman 15” phenomenon suggested that as many as one-third of college freshman may actually lose weight during their first year (Jung, Bray, & Ginis, 2008), and thus this myth is typically espoused within the media. Other researchers have found that, although there is a modest weight gain in the first year of college, this trend actually slows in consecutive years and may not be a cause for concern (Hull, Morrow, Dinger, Han, & Fields, 2007; Morrow, Heesch, Dinger, Hull, Kneehans, & Fields, 2006). However, many researchers have agreed that although the 15 pound gain is somewhat exaggerated, a significant weight gain ranging from two to seven pounds has been observed in college freshman and even in other college cohorts (Adams & Rini, 2007; Anderson, Shapiro, & Lundgren, 2003;
Hoffman, Policastro, Quick, & Lee, 2006; Holm-Denoma, Joiner, Vohs, & Heatherton, 2008; Levitsky, Halbmaier, & Mrdjenovic, 2004; Kasparek, Corwin, Valois, Sargent, and Morris, 2008; Mihalopoulos, Auinger, & Klein, 2008; Racette, Deusinger, Strube, Highstein, & Deusinger, 2005; Racette, Deusinger, Strube, Highstein, & Deusinger, 2008). The research thus far has yielded conflicting results regarding the presence of a drastic weight gain within the college environment. Therefore, more investigation is needed to determine if a rapid weight gain is present during the first year of college due to the potential health consequences associated with overweight and obesity. Also, if a significant weight gain is prevalent within the college environment, it is clear that the potential causes of this weight gain need to be further explored so that possible intervention strategies can be implemented which may help limit future negative health consequences (See Table 1 for a review of research findings).

Table 1

Summation of the Research Regarding the Freshman 15 Phenomenon

<table>
<thead>
<tr>
<th>Weight Gain Supported/Not Supported Authors</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Supported</td>
<td></td>
</tr>
<tr>
<td>Morrow et al. 2006</td>
<td>Average weight gain 2.4 lbs</td>
</tr>
<tr>
<td>Jung et al. 2008</td>
<td>One-third of sample lost weight</td>
</tr>
<tr>
<td>Hull et al. 2007</td>
<td>Weight gain slowed in Sophomore year</td>
</tr>
<tr>
<td>Brown 2008</td>
<td>Review of literature 4.6 lbs weight gain</td>
</tr>
<tr>
<td>Supported</td>
<td></td>
</tr>
<tr>
<td>Anderson et al. 2003</td>
<td>73% of students gained weight</td>
</tr>
<tr>
<td>Hoffman et al. 2006</td>
<td>Average weight gain was 6.82 lbs</td>
</tr>
<tr>
<td>Levitsky et al. 2004</td>
<td>Significant weight gain of 1.9 kg</td>
</tr>
<tr>
<td>Mihalopoulos et al. 2008</td>
<td>Average weight gain was 7.4 lbs</td>
</tr>
</tbody>
</table>
Weight Changes

Adams et al. 2007  Higher BMI related to poor food choice
Pliner et al. 2008  Significant weight gain related to unhealthy eating
Beerman et al. 1990  Living on campus a risk factor
Kasperek et al. 2008  Significant weight gain of 2.5 lbs
Racette et al. 2005 & 2008  Physical activity decline responsible for weight gain
Holm-Denoma et al. 2008  Identified factors related to weight gain

Weight Gain Not Supported

Several researchers who have investigated the prevalence of the “freshman 15” phenomenon have not found support for a significant weight gain within the freshman year of college. In one study, Morrow, Heesch, Dinger, Hull, Kneehans, and Fields (2006) investigated the changes in weight and BMI of 137 freshman women. The participants’ height and weight measurements were taken in the fall of their freshman year and then again before the end of their spring term. The authors found that the average weight gain was only 2.4 pounds which was not significant. Based on these results, the authors suggested that weight gain of 15 pounds was not supported, and that over time, it is believed that this weight gain would plateau and would not contribute to growing obesity rates in the country. Some limitations of this study, however, were the fact that the researchers did not collect nutritional data such as caloric intake and thus a clearer picture of the overall balance of energy could not be investigated.

In another study, Jung, Bray, and Ginis (2008) tracked the physical activity and diet of 133 first year women at a Canadian university. The researchers hypothesized that decreased physical activity and increased caloric consumption would lead to weight gain. The investigators observed only those living on campus to control for food intake, and
they utilized the Godin Leisure Time Questionnaire (Godin & Shephard, 1985) to assess for physical activity levels and a 3-day food log to assess for caloric consumption. They found that although the average weight gain was 3.08 pounds which was significant, over one-third of the sample actually lost weight over the course of the first year. The average weight lost was 5.3 pounds. The average weight that was gained by those who did gain weight was 7.4 pounds. Also, caloric consumption tended to decrease between the fall and spring measurement phases. The authors concluded that those who gained weight substantially decreased their physical activity levels, and those who lost weight increased their physical activity levels.

Hull, Morrow, Dinger, Han, and Fields (2007) investigated changes in body weight and body fat in sophomore women in Oklahoma to determine the impact of living on campus versus living off campus on subsequent weight change. The researchers recruited women who participated in a previous “freshman 15” study the prior year. Women in this study tended to gain approximately .18 kg/month during their freshman year, but they gained only .02 kg/month in their sophomore year which suggest that the weight gain would even out of the course of all four years. The participants also tended to lose about 1% of their body fat in their sophomore year. The researchers cited the obvious difference of off campus versus on campus living situations as an explanation for resulting weight gain in freshman year and weight loss or stability in sophomore year. The authors stated that forced meal plans for those who reside on campus may be to blame for significant weight increases in the freshman year of college.

Brown (2008) also analyzed the weight gain in freshman college students within the research and popular media. The author searched a total of 23 on line library data
bases for mention of the freshman 15 (6.804 kg) weight gain and found 333 articles mentioning college weight gain that were published between 1985 and 2006. Most of these articles were published in newspapers, university papers, and magazines. Only 14 of the articles were from peer-reviewed journals. Of those cited in peer reviewed journals, some weight gain was found, but it was far less than the 15 pounds that were feared. The author stated that the fear that is perpetuated by certain media sources can often prompt vulnerable college students into engaging in unhealthy weight loss methods which can cause unnecessary psychological and physical stress.

*Weight Gain Supported*

Although there were several researchers that refuted the “freshman 15” weight gain, there were several authors who agreed that there was a significant weight gain among college freshman that could become a trend which would add to the growing epidemic of obesity and overweight. In a study by Anderson, Shapiro, and Lundgren (2003), the researchers investigated whether the freshman year of college was a critical time for weight gain amongst American adults. They sampled 135 college students in September and December of their freshman year of college at a university in New York. The researchers found that students gained an average of 1.3 kg (2.86 pounds), and weight measurements ranged from a loss of 3.6 kg to a gain of up to 5.2 kg (loss of 7.93 lbs to a gain of 11.46 lbs). Approximately 75% of students gained weight, and a total of 14% of participants who were originally classified as normal weight were reclassified as overweight at the end of the study. The authors suggested that future researchers should examine the possible factors that contribute to this freshman weight gain.
Hoffman, Policastro, Quick, and Lee (2006) examined changes in body weight and body fat of 67 men and women in their first year of college at Rutgers University. These individuals were not considered to be overweight or obese at the beginning of the study, and the average change in body weight was 2.86 pounds and the change in body fat was 0.7%. In this instance, some students lost weight over the course of the year, but the majority gained weight, and average weight gain was a statistically significant 6.82 pounds. The authors speculated that if this level of weight gain was maintained throughout all four years of college, the students could gain a total of 27 pounds by the time of graduation. They encouraged future researchers to find the variables responsible for such a large weight gain over such a short period of time.

In another study, Levitsky, Halbmaier, and Mrdjenovic (2004) investigated the factors responsible for freshman weight gain in the first 3 months of college at Cornell University. The researchers monitored 60 freshmen on things like their eating, sleeping, and exercise habits during the first 12 weeks of school. They found an average significant weight gain of 1.9 kg (approximately 4.2 pounds), although students’ overall weight change ranged from a loss of 5.9 kg to a gain of as much as 8.6 kg (loss of 13 pounds to a gain of 19 pounds). The researchers found that the two things that best predicted weight gain were an increase in the consumption of high-fat foods and eating at all-you-can-eat student cafeterias.

Mihalopoulos, Auinger, and Klein (2008) also investigated the myth of the “freshman 15” and they examined the changes by gender. The researchers investigated the weight change of 125 students over the course of their freshman year of college at a small Northeastern university. They found a significant increase in weight of 2.7 pounds.
The men in their sample increased their weight by an average of 3.7 pounds, and the women increased their weight by an average of 1.7 pounds. The weight changes ranged from a loss of 5 pounds to a gain of 20 pounds, and the average weight gain was 7.4 pounds. Also, those who entered the study with a lower BMI tended to gain more than those who entered with a higher BMI. Although the researchers did not find a 15 pound weight gain, they did indicate that the average weight gain over the course of one year for the participants in the study was over 6 times the national average for the same period of time, and if this trend continued, many of the students could become obese (BMI > 30) in only a few years.

Adams and Rini (2007) examined changes in BMI of college freshman over the course of the first year of college. The researchers examined the average weight change in students enrolled at a Midwestern university. They hypothesized that if a weight gain was discovered, that the collegiate environment could be a potential source for an intervention. The researchers found that women who had an increase in BMI were more likely to consume alcohol, eat foods low in fiber and nutritional value, and less likely to eat vegetables. However, these findings were limited and future research was cautioned before any intervention strategy could be implemented.

Pliner and Saunders (2008) examined possible factors that could contribute to freshman weight gain. They sampled 113 freshmen at a Canadian university in October and March of their first year of college. Students were asked to record the frequency of consumption of 69 different foods and beverages that were chosen for their popularity among college students. Students also completed the Revised Restraint Scale which is a measure of one’s restraint when eating (i.e. if one avoids eating certain foods). The
researchers found that students had a significant weight gain, but that dietary restraint and where one lived played a significant role. Those who engaged in a large amount of dietary restraint and who also lived on campus gained a significantly larger amount of weight than all other students. Also, the students who showed the greatest trend towards unhealthy eating (i.e. consumption of foods high in fat and calories and low in nutritional value) on the food consumption index gained the most weight in this sample. However, although these students tended to eat more unhealthy items, actual caloric intake was not measured.

In another study, Beerman, Jennings, and Crawford (1990) examined the effects of student residence on food choice of first year students enrolled at a Washington university. The researchers sampled students in their spring semester of their freshman year in 1988. About 40% of the students lived on campus. The researchers discovered that those students who lived on campus consumed alcohol and sweets more frequently than those who resided off campus. However, the authors utilized self-report measures and did not assess caloric intake which makes their results less generalizable to other student populations, and actual weight change was not assessed.

Kasparek, Corwin, Valois, Sargent, and Morris (2008) also investigated possible factors that could contribute to weight gain in the first year of college. The researchers examined the effect of physical activity, fruit and vegetable consumption, and alcohol use as possible factors to explain the changes in weight over the course of the first year of college at a university in South Carolina. The researchers utilized the Youth Risk Behavior Survey (YRBS) to assess physical activity and alcohol consumption. They utilized a Food Frequency Questionnaire to establish the amounts of fruits, vegetables,
and sweets students consumed. The authors found that those students who gained weight gained an average of 6.21 pounds. Additionally, those who initially presented as overweight (BMI > 25) and who also gained weight gained an average of 10.96 pounds which was statistically different from the normal weight individuals. Most of the students in this sample engaged in low to moderate amounts of physical activity over the course of the study. Additionally, those who entered the study as overweight or obese engaged in a lower amount of physical activity than their normal weight counterparts. Approximately two-thirds of students sampled reported having consumed at least some alcohol over the course of the study. The researchers stated that not only are freshman students gaining a significant amount of weight in their freshman year of college, but that those who are overweight are becoming significantly more overweight which is adding to a growing epidemic of obesity and overweight if this trend continues throughout adulthood (Kasparek, Corwin, Valois, Sargent, & Morris, 2008).

Many researchers have expressed caution about the possibility that the freshman weight gain could contribute to increased overweight and obesity rates if this trend continues into adulthood. Freshman students have been found to gain a significantly larger amount of weight over the course of a year than the average American which could signal an acceleration of overweight and obesity rates if this trend continues for several years. Racette, Deusinger, Strube, Highstein, and Deusinger (2005) examined changes in weight, diet, and exercise patterns of both freshman and sophomores at a university in Missouri. The researchers gathered height and weight data, information regarding participation in aerobic and strength exercises, and information regarding food intake which was obtained using a dietary questionnaire assessing things like fruit and vegetable
consumption, fried food consumption, and alcoholic beverage consumption. They sampled a total of 764 students over the course of their first two years of college. They found that at the end of the sophomore year, average body weight increased by 70% and by an average of 4.1 pounds. Aerobic exercise rates declined, and the consumption of high calorie foods did not change. The researchers speculated that a slowing of physical activity and poor dietary behaviors contributed to an unhealthy weight gain for these students and that this trend continued beyond the first year of college.

In response to the finding that weight gain continues beyond the first year of college and into the second year (Racette, Deusinger, Strube, Highstein, & Deusinger, 2005) Racette, Deusinger, Strube, Highstein, and Deusinger (2008) then examined whether or not this trend continued throughout the four years of college. The researchers sampled students in the first two weeks of their freshman year and the last two weeks of their senior year. They obtained BMI, weight, physical activity measurements, and food intake measurements. By the senior year, the prevalence of obesity changed significantly from 15% to 23%. Also, aerobic activity rates declined by senior year, and the consumption of high calorie food increased. The authors stated that although the weight gain trend tended to slow over the course of the four years of college, there were still significant changes between the freshman and senior years.

Holm-Denoma, Joiner, Heatherton, and Vohs (2008) examined weight changes of 266 men and 341 women at Dartmouth College. Based upon prior findings that food consumption, exercise habits, and alcohol consumption were suspected factors contributing to the freshman weight gain found in previous studies (Kasparek, Corwin, Valois, Sargent, & Morris, 2008; Racette, Deusinger, Strube, Highstein, & Deusinger,
2005), the researchers investigated different variables that could be responsible for the mythical “freshman 15.” They first created a survey entitled the Health and Eating Patterns Research Questionnaire which included demographic information and assessed for things like body image, exercise habits, diet history, substance use, and eating problems. They also administered the Eating Disorders Inventory (EDI), The State Self-Esteem Scale (SSES), and the Revised Restraint Scale (RRS). The researchers then conducted a factor analysis to determine the best factors that could predict subsequent weight change. They found that men gained an average of 3.5 pounds while women gained an average of 4.0 pounds, and the significant factors were disordered eating, exercise, negative mood, body image, interpersonal problems, alcohol use, and healthy eating. Although it was difficult to partition the exact contribution that each of these factors had on the students sampled due to the fluctuation obtained across individuals, the researches stated that these predictors should be further explored in future research so as to finalize some areas of intervention in the collegiate environment.

**Hypotheses**

As evidenced across much of the literature, there is a significant amount of weight gain that often occurs during the freshman year of college that vastly exceeds the typical weight gain of 1-2 pounds per year for the average American adult (Cole-Peralta, 2007). Although there is no indication that freshman gain a total of 15 pounds in this short time frame, there is still some cause for concern. Many researchers have found an average weight gain of 2-7 pounds in the first year of college which is much greater than the 1-2 pounds that the typical adult will gain over the course of a year (Adams & Rini, 2007; Anderson, Shapiro, & Lundgren, 2003; Hoffman, Policastro, Quick, & Lee, 2006; Holm-
Denoma, Joiner, Vohs, & Heatherton, 2008; Levitsky, Halbmaier, & Mrdjenovic, 2004; Kasparek, Corwin, Valois, Sargent, and Morris, 2008; Mihalopoulos, Auinger, & Klein, 2008; Racette, Deusinger, Strube, Highstein, & Deusinger, 2005; Racette, Deusinger, Strube, Highstein, & Deusinger, 2008). This could lead to an alarming increase in overweight and obesity rates, and likewise could add to the growing health problems that are seen in this group such as cardiovascular disease, hypertension, and Type 2 diabetes (Elmer, Brown, Nichols, & Oster, 2004).

A common finding across much of the literature is that the freshman year is a source of weight gain, and that possible factors responsible for this weight gain need to be identified so that specific intervention strategies can be implemented in this vulnerable population. However, a significant limitation across much of the literature is that many studies were conducted on the East coast or Midwestern part of the country where there may be specific attitudes about health and wellness that may not be representative of all parts of the country. The only study that was conducted on the West coast did not assess overall weight change and instead examined how residence affects food choice (Beerman, Jennings, & Crawford, 1990). It is possible that there are certain environmental contributors that the West Coast may have on this freshman weight gain that have not yet been considered. For example, the environment of the West coast may be one of more healthy eating attitudes and thus this may serve as a protective factor against the typical weight gain that is found in other studies. National BMI statistics indicate that the West Coast and New England have the lowest obesity rates (Ezzati, Martin, Skjold, Hoorn, & Murray, 2006). On the other hand, the Pacific Northwest, may have environmental factors such as weather that could contribute to more sedentary
lifestyles and a resulting weight gain that is similar to or perhaps even greater than that found in other studies.

The purpose of this study then is to investigate the prevalence of the reported freshman weight gain in a small school in the Pacific Northwest in order to determine if there are similar trends as found in other studies and to identify possible factors that could be contributing to any observed weight gain. In accordance with much of the literature, a significant weight gain has been found in many other parts of the country, and thus it is hypothesized that this finding will be replicated in the present study. Also, it is believed that the contributing factors such as food consumption and caloric intake, increased alcohol consumption, decreased physical activity, dietary restraint, and overall physical health will contribute to any observed weight gain because these factors were found to contribute to weight gain across the literature (Holm-Denoma, Joiner, Heatherton, & Vohs, 2008; Kasparek, Corwin, Valois, Sargent, & Morris, 2008; Pliner, & Saunders, 2008). Finally, a measure of the physical environment was created for this study to assess whether there is a trend in the Pacific Northwest to engage in a healthier lifestyle. It is believed that those students who endorse engaging in healthy activities will also show a smaller weight gain or even a weight loss compared to those students who did not endorse such activities. If it is found that certain physical environment factors mitigate weight gain, this could be a source of future intervention strategies at other institutions that do not yet utilize such practices.
Method

Participants and Setting

The present study took place at a small, private college in Oregon. Participants were recruited from introductory psychology courses following the permission of the Department Chair, and they were offered course credit for completion of this study at the discretion of individual professors. Students were included in this study if they were first year freshman students, if they were at least 18 years of age, and if they had transitioned directly from high school to college. Participants included both men and women between the ages of 18 and 20. The present study took place at two separate times, once in November (Time 1) and again at the end of the spring term in late April (Time 2). At each phase of the study, participants had the option of choosing between two different days to participate so as to minimize scheduling conflicts. Participation took approximately 30 minutes and ranged between 20 and 60 minutes total.

Research Design and Procedure

Participants were initially contacted by an email which was sent out to all those enrolled in the introduction to psychology course in the fall of 2008 (See Appendix 1). The email requested first year students over the age of 18 to participate in a study about health behaviors. The email described the purpose of the study and indicated that those who participated in both phases of the study would be eligible to win a gift card and that they would also receive course credit for their participation per their professor’s discretion. Those students who responded with interest to this initial email were then provided with two days and possible time windows of when they could participate, and they were asked to sign up for a time slot of approximately 45 minutes.
A total of 23 students participated in the first data collection point which occurred in November of 2008. When students arrived at the designated classroom, informed consent was obtained. Those who were interested were provided with a written copy of their informed consent form. This document explained the purpose and design of the study. Those students who agreed to participate were assigned a random number and all documents that contained the student’s identifying information were kept separate from their measures to create anonymity and to protect confidentiality. In order to associate data across collection dates, students were asked to provide a preferred email address that they checked often which would be used to inform them of the next phase of the study. This information was also kept separate from the students’ measures. Students then completed all six assessment measures. Finally, students’ height and weight measurements were obtained, and they were asked to remove any outerwear and shoes so as to maintain consistency across data points. At the end of the spring semester in late April of 2009, participants were emailed again and were provided with two dates and possible time frames for them to complete the second phase of the study which would also take about 45 minutes to complete. Ten of those who completed the first phase then completed the second phase of the study. Students again completed the same measurements and their height and weight measurements were again taken.

**Measures**

Students were asked to sign the informed consent form before they were allowed to complete the measurement tools. A digital scale and a tape measure were used to obtain weight and height measurements. Students were then provided with a demographic questionnaire which asked their age, their year in school, their gender, and their ethnicity
Weight Changes

(See Appendix 2). This document was also where the student’s height and weight information was recorded, as well as their preferred email address. Students then received the six measurements and a final notice of participation document that would provide proof of participation so that the student could receive course credit from their professor.

Three Day Food Log

The 3-Day Food Log (Crawford, 1994) measured the types of foods students consumed during the week proceeding participation (See Appendix 3). Students were asked to record what they consumed on two recent week days and one recent weekend day during a seven day measurement period. This information would then be translated into total calories consumed during a three day period using a standard caloric calculator found at an online calorie counter database (http://www.caloriecounter.com/). The data will then be used to assess whether caloric intake influences overall weight in both phases of the study.

Godin Leisure Time Questionnaire

The Godin Leisure Time Exercise Questionnaire (Godin & Shephard, 1985) assessed the amount and type of physical activity engaged in during a seven day measurement period (See Appendix 4). The students indicated the types of activities they engaged in during a week, and responses were then weighted based upon the amount of physical exertion involved and summed to create a total score. This information will then be used to determine if physical exercise impacts overall weight at both phases of the study. The Godin Leisure Time Questionnaire (1985) was normed on 306 healthy adults of both sexes, and reliability was found to range between .83 and .85 for this sample.

Multidimensional Health Locus of Control
The Multidimensional Health Locus of Control (Wallston, Wallston, & DeVillis, 1978) was used to assess students’ perceived level of control over health related outcomes in their lives (See Appendix 5), and the relationship this may have with weight control. The results will be used to formulate intervention strategies that are aligned with students’ perceived sources of control. The Multidimensional Health Locus of Control has been normed on a variety of adult populations, and internal consistency ratings ranged from .67 to .77 (Russell & Ludenia, 1983).

**Youth Risk Behavior Survey**

The 2009 Youth Risk Behavior Survey (Centers for Disease Control, 2008) is a self-report measure designed to assess the rates of certain types of risky behaviors such as the consumption of alcohol or drugs that students may have engaged in during a 30 day period (See Appendix 6). The measure was administered to this sample to assess for certain types of behaviors identified in the literature that could contribute to weight gain such as cigarette smoking, consuming alcohol, binge drinking, restricting calories, and physical activity in general and physical activity used to lose weight (Kasperek, Corwin, Valois, Sargent, and Morris, 2008; Racette, Deusinger, Strube, Highstein, and Deusinger, 2005). This information will be used to verify which mediators, if any, are related to overall weight change. Test-retest reliability was assessed and was found to range between .39 and .72 across all of the categories assessed by this comprehensive self-report measure (Brener, Billy, & Grady, 2003).

**Three Factor Eating Questionnaire**

The Three Factor Eating Questionnaire (Boschi, Iorio, Margiotta, D’Orsi, & Falconi, 2001) is designed to assess eating patterns within the general population that
could contribute to eating disorders and obesity (See Appendix 7). The Three Factor Eating Questionnaire (2001) was originally developed to be used on obese populations, but it has also been applied and normed on normal-weight adults. It is an 18 item questionnaire which is designed to identify people as having one of three different eating patterns; cognitive restraint, emotional eating, and uncontrolled eating. Those who show a higher level of restraint often eat healthier foods such as lean proteins and vegetables, those who identify as emotional eaters tend to eat more junk food that is high in calories and low in nutritional value, and those who identify as uncontrolled eaters tend to eat foods higher in sugars and fats (de Lauzon et al., 2004). It is believed that these eating patterns play a significant role in the development of eating disorders and obesity, and thus this information will determine if a participant’s eating style mediates their overall weight change. The measure has been found to show satisfactory internal consistency in adult and teenage samples. It is able to adequately distinguish between the three types of eating patterns it is designed to measure (deLauzon et al., 2004). The scale has reliability ratings that range from $.78$ to $.84$ when utilized on the general teenage and adult populations.

*Measure of the Physical Environment*

The Measure of the Physical Environment is a measure designed for this study that assessed different environmental factors found at the university that may contribute to a student’s overall health (See Appendix 8). It assessed the student’s use of healthy food options and physical activity choices available on or near the campus, and this information will inform which environmental factors may be related to weight change.
Results

Twenty-one of the original 23 participants completed all the measurements during the first phase of the study, and ten completed the second phase of the study. Of the 21, 4 were men, 17 were women, 12 were White, 2 were Hispanic, 3 were Asian, and 4 identified as another race. The majority of participants (17 students) were 19 years old, one was 18, and three were 20 (See Figures 1-6 for weight distributions that correspond to these demographic variables).

*Figure 1.* Time 1 Weight as a Function of Gender

*Figure 2.* Time 1 Weight as a Function of Ethnicity
Figure 3. Time 1 Weight as a Function of Age

Figure 4. Time 2 Weight as a Function of Gender
Figure 5. Time 2 Weight as a Function of Ethnicity

Figure 6. Time 2 Weight as a Function of Age
Means and standard deviations for the weight measurements, BMI results, and caloric intake at Time 1 and Time 2 can be found in Table 2.

Table 2

*Means and Standard Deviations of Key Variables*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beginning Weight</td>
<td>155.0 lbs</td>
<td>46.37 lbs</td>
</tr>
<tr>
<td>Ending Weight</td>
<td>175.26 lbs</td>
<td>58.34 lbs</td>
</tr>
<tr>
<td>Beginning BMI</td>
<td>27.91 kg/m²</td>
<td>10.15 kg/m²</td>
</tr>
<tr>
<td>Ending BMI</td>
<td>28.40 kg/m²</td>
<td>10.09 kg/m²</td>
</tr>
<tr>
<td>Beginning Caloric Intake</td>
<td>5054.40 kcal</td>
<td>1752.17 kcal</td>
</tr>
<tr>
<td>(Over a three day period)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ending Caloric Intake</td>
<td>4660.15 kcal</td>
<td>1200.22 kcal</td>
</tr>
<tr>
<td>(Over a three day period)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The distributions for Time 1 and Time 2 weights for this sample were both normally distributed, although they were positively skewed. A paired-samples t test was conducted to determine if there was a significant weight change in individuals who completed both the November and the April phases of the study (n = 10). The results indicated that there was no significant difference between the average weight in November and the average weight in April (See Table 2), *t*(9) = -1.79, *p* = .11. The standardized effect size, *η²*, was
Weight Changes

.26, and there was considerable overlap in weight measurements between Time 1 and Time 2. The 95% confidence interval for the mean difference between the starting and ending weights of the sample was between -7.46 and .86. The average weight change for participants was 3.30 lbs (SD = 5.82), and weight change ranged from a loss of 4 lbs to a gain of 12 lbs.

Additional paired-samples $t$ tests were conducted to determine if there was a significant change in BMI, total caloric intake, and physical activity for participants who completed both phases of the study. No significant differences were found in the average BMI ratings (See Table 2) between November and April, $t(9) = -1.59$, $p = .145$, $\eta^2 = .22$. Additionally, no significant differences were found in average caloric intake (See Table 1) between the first and the second phase of the study, $t(9) = 1.03$, $p = .33$, $\eta^2 = .10$. Also, there were no significant difference found between the average Time 1 ($M = 40.40$, $SD = 24.93$) and Time 2 ($M = 41.20$, $SD = 22.49$) physical activity levels as measured by the Godin Leisure Time Questionnaire (calculated using total weighted hours of activity in a seven day period), $t(9) = -.08$, $p = .93$, $\eta^2 = .00$.

An analysis was then conducted on the data obtained from the Multidimensional Health Locus of Control (Wallston, Wallston, & DeVillis, 1978) to investigate the different loci of control that the students in this sample identified with which could be informative with regard to future intervention strategies. All of the students in this sample identified as having an internal locus of control at both the first ($M = 28.6$, $SD = 3.17$) and the second ($M = 28.0$, $SD = 3.83$) phases of the study and scores for this subscale ranged from 23 to 33 at both time points.
Correlations were then conducted to determine if an individual’s weight at Time 1 was significantly related to their reported physical activity levels as measured by the Godin Leisure Time Questionnaire (Godin & Shephard, 1985), and their total caloric intake as measured by the 3-Day Food Log (Crawford, 1994). Using a Bonferroni correction to account for Type I error across the three correlations, a \( p \) value of less than .01 (.05/3 = .01) was required for significance. The results of the correlational analysis indicated that the relationship between Time 1 weight, activity level, and caloric intake were not significant for this sample. Also, correlations were conducted to determine if an individual’s Time 2 weight was significantly related to their physical activity levels and their caloric intake in between the first and second phase of the study. Again, a Bonferroni adjustment was made and the \( p \) value was set at the .01 level of significance. The results also indicated that the relationship between ending weight, activity level, and caloric intake was not significant for this sample.

Correlation coefficients were then computed among six key weight related variables on the Youth Risk Behavior Survey (2008; cigarette smoking in the past 30 days, alcohol consumption in the past 30 days, binge drinking in the past 30 days, caloric restriction behaviors, exercise behaviors to lose weight, and general physical activity in the past week) to determine if any of these factors were related to an individual’s Time 1 weight. A Bonferroni adjustment was made to control for Type I error, and the \( p \) value required for significance was set at .002 (.05/21 = .002). The results of the correlational analyses are presented in Table 3.
Table 3

Correlations among Key Questions on the Youth Risk Behavior Survey and Starting Weight (N = 10)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Weight</td>
<td>--</td>
<td>-.252</td>
<td>-.367</td>
<td>.485</td>
<td>-.463</td>
<td>.145</td>
<td></td>
</tr>
<tr>
<td>2. Cigarette Use</td>
<td>--</td>
<td>.788</td>
<td>.785</td>
<td>-.208</td>
<td>-.272</td>
<td>-.058</td>
<td></td>
</tr>
<tr>
<td>3. Alcohol Use</td>
<td>--</td>
<td>.964</td>
<td>.00</td>
<td>.00</td>
<td>.111</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Binge Drinking</td>
<td>--</td>
<td>-.30</td>
<td>-.173</td>
<td>.154</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Calorie Restriction</td>
<td>--</td>
<td>.218</td>
<td>.035</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Exercise for Weight loss</td>
<td>--</td>
<td>-.336</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Physical Activity in a week</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .005

The only variables that were significantly related were binge drinking and alcohol use (r = .96), which is a logical outcome because these two questions are assessing similar behavior. The variables that had the greatest relationship to one’s weight at Time 1 were caloric restriction (r = .48) and exercising to lose weight (r = -.46). These results suggest that a greater weight was associated with more calorie restricting behaviors, and a lower weight was associated with more physical exercise aimed at losing weight. The results were similar when Time 2 weights were compared to these six key questions, and the relationship between one’s Time 2 weight and caloric restriction behaviors was strong (r = .49) as was the relationship between one’s Time 2 weight and physical exercise behaviors with the goal of losing weight (r = -.51).

Results from the Three-Factor Eating Questionnaire (Boschi et al., 2001) were then correlated with participants’ weights at Time 1 and Time 2 to determine which sub-factors were related to one’s weight. A Bonferroni adjustment was made which reduced
the $p$ value needed for significance to .008 (.05/6 = .008). Although the results were not significant, uncontrolled eating had the strongest relationship to an individual’s Time 1 weight ($r = .27$); those who had a greater weight also tended to identify as an uncontrolled eater. A similar analysis was conducted to determine if any of the sub-factors was related to one’s weight at Time 2. At this point in the study, restrained eating had the strongest relationship to an individual’s weight ($r = .32$) in that those who had a greater Time 2 weight also identified as being restrained eaters.

A simple correlation was also conducted to determine if one’s physical environment had a relationship with one’s Time 1 and Time 2 weights. The Measure of the Physical Environment assessed the frequency that a student utilized healthy options available to them on campus such as the fitness center and low fat food options at the cafeteria. The results of the correlation analyses indicated that one’s use of healthy options on campus was not significantly related to either their weight at either Time 1 or Time 2.

Finally, a multiple regression analysis was conducted to evaluate how well the change in certain key variables predicted overall weight change. The predictors were the change in the participant’s use of healthy campus options, the change in one’s physical activity levels, and the change in one’s caloric intake. The criterion variable was overall weight change. The linear combination of the three predictor variables was not significantly related to weight change, $F(3, 6) = .695, p = .58$. The sample multiple correlation coefficient was .51, indicating that approximately 26% of the variance of total weight change can be accounted for by the linear combination of the three predictor variables. None of the partial correlations between the predictor variables and overall
weight change were significant. However, total activity change accounted for 34% of the total variance in weight change. This result is similar to that found in much of the literature on freshman weight gain (Holm-Denoma, Joiner, Heatherton, & Vohs, 2008; Kasparek, Corwin, Valois, Sargent, & Morris, 2008; Racette, Deusinger, Strube, Highstein, & Deusinger, 2005).

Discussion

The purpose of this study was to determine if the students at a small college in the Pacific Northwest experienced a significant weight gain over the course of their freshman year of college. It was hypothesized that students would experience a substantial weight gain that was consistent with much of the literature regarding the purported “freshman 15” (Adams & Rini, 2007; Anderson, Shapiro, & Lundgren, 2003; Hoffman, Policastro, Quick, & Lee, 2006; Holm-Denoma, Joiner, Vohs, & Heatherton, 2008; Levitsky, Halbmaier, & Mrdjnovic, 2004; Kasparek, Corwin, Valois, Sargent, and Morris, 2008; Mihalopoulos, Auinger, & Klein, 2008; Racette, Deusinger, Strube, Highstein, & Deusinger, 2005; Racette, Deusinger, Strube, Highstein, & Deusinger, 2008). The results of this study, however, do not support this hypothesis. Students did not gain a significant amount of weight during their freshman year of college, although the average weight gain of 3.30 pounds is greater than the average weight gain per year for adults in the U.S. Also, there are no significant changes with regard to BMI, caloric intake, and physical activity levels between the first and second phases of the study for the students in this sample. These results are most consistent with Morrow, Heesch, Kinger, Hull, Kneehans, and Fields (2006) who reported a modest weight gain in students who were sampled during their fall and spring semesters of college.
Another purpose of this study was to identify possible factors that might have contributed to the observed weight gain. An analysis of the relationship between caloric intake and physical activity reveals that these two factors are not significantly related to either Time 1 or Time 2 weight measurements. Also, the use of healthy options on campus such as the fitness center and low calorie food options at the cafeteria are not significantly related to weight at both Time 1 and Time 2. When specific behaviors such as drinking, smoking, and dieting are taken into consideration caloric restriction activities are found to be associated with a greater weight at both Time 1 and Time 2, and physical activity with the goal of losing weight is associated with a lower weight at Time 1 and Time 2, although these results are not significant. These results are somewhat surprising because those who dieted were engaging in a behavior designed to lessen their weight, and this is correlated with greater weights overall. However, it is possible that individuals who began the study with greater weights at Time 1 were already engaging in these behaviors in an effort to decrease their weight. The engagement in physical activity, however, was associated with a lower Time 1 and Time 2 weight which is a logical outcome and may be indicative of the fact that those who had an established exercise pattern were those who were already slim to begin with. Finally, with regard to making predictions about weight change, changes in physical activity are found to explain the greatest total variance in overall weight change between the first and second phases of the study, but this is also not a significant result.

An analysis of eating patterns also yields an interesting result. As expected, those who identified as being uncontrolled eaters tended to weigh more at the beginning of the study, but those who identified as being controlled eaters tended to have greater weights
at the end of the study. Typically, someone who identifies as being an uncontrolled eater consumes foods that are higher in sugar and fat content and typically weigh more, and someone who identifies as being a controlled eater will often consume more nutritious foods and will likely weigh less (Boschi et al., 2001). However, the students in this sample displayed an opposite trend with regard to their ending weights. These results could be indicative of a shift in individuals from more uncontrolled eating behaviors towards more restrained eating because they were perhaps at a perceived undesirable weight and wished to change this by engaging in more healthy behaviors.

One important finding with regard to future intervention strategies was the analysis of an individual’s locus of control concerning health behaviors. All of the students in the sample identified as having an internal locus of control with regard to their overall health, and this equates to a belief that one can find solution to medical problems within themselves (Wallston, Wallston, & DeVillis, 1978). This should be considered when future researchers attempt to identify intervention strategies because, according to the results of this study, students view themselves as the source of solutions to problems and thus they may be more inclined to respond to a procedure that is collaborative in nature.

Although most of the results of this study are not statistically significant, some interesting conclusions can be made. First, students tend to, on average, gain weight, and this effect was found with a total sample of only ten individuals. This result may indicate a trend that could move towards significance with a larger sample size. Therefore, a more inclusive study is necessary to determine if this weight gain can be generalized to the majority of first year students. Also, although typical correlates such as physical activity
and caloric intake were not related to weight measurements at any point in the study, these factors are often found to correlate with weight in that students who consume more calories and exercise less tend to weigh more (Holm-Denoma, Joiner, Heatherton, & Vohs, 2008). Therefore, these factors should be explored throughout the research to determine if they have an effect on weight measurements in future samples. The utilization of resources on campus that are often correlated with healthy weights was also not found to relate to weight measurements in this sample. It could be that the Pacific Northwest does not necessarily provide a protective factor against weight gain (Ezzati, Martin, Skjold, Hoorn, & Murray, 2006) and thus the “freshman 15” phenomenon may be widespread. Caloric restriction behaviors are found to be associated with greater weights overall, and as other researchers have concluded, this may actually be a detriment to maintaining a healthy weight (Pliner & Saunders, 2008). It is unclear, however, if caloric restriction is a response to a self-identified unhealthy weight in an individual, or if caloric restriction causes one to gain weight, and future researchers should further address this relationship. Also, as expected, those who exercise to lose weight tend to weigh less, but this effect is best illustrated in specific behavioral questions. Therefore, it is possible that a more comprehensive physical activity measure may yield more accurate results with regard to the effect of exercise on weight measurements because it explains a large portion of one’s overall weight change in this study. Additionally, an analysis of a person’s overall eating patterns tended to yield inconsistent results, and therefore this factor should continue to be assessed in future research because it may indicate an underlying change in behavior and may mediate any observed effects.
A final goal of this study was to identify possible avenues of future intervention strategies. It is clear that physical activity plays an important role in weight changes in individuals, and eating habits may also be a target for interventions. Strategies that may help to minimize weight gain should focus on improving physical activity levels in students and helping them to make healthy food options. However, it is evident from this study that students perceive themselves as capable of becoming the solution to health problems, and perhaps future researches could utilize this by creating intervention strategies that are created collaboratively with individual students. Students may be more likely to follow through with exercise regimes that are individualized. They may also respond better to nutritional interventions if they are made aware of how dieting and eating patterns affect a person’s weight. If they perceive themselves as the agent in control of their overall health, they may also be more likely to make changes to produce better outcomes. However, these recommendations are only provisional in that most of the results of this study were not found to be significant due to a small sample size and the conclusions that were drawn were only speculative.

There are several limitations to this study. First, the sample size is too small to reveal even a moderate effect size, and thus many of the results are not significant. However, a larger sample size might have yielded significance given the trends in this study. Also, students were sampled in November for the first phase of this study, and a more prominent effect might have been found if students were sampled at the beginning of the academic year. Additionally, the Youth Risk Behavior Survey (CDC, 2008) was adapted from a version that was designed to be implemented with high school students, and therefore its applicability was limited with this sample. Future researchers should
utilize a different tool to assess these factors. The measure of the physical environment was also created for this study, and it may not be applicable on other college campuses. It was also designed as a general tool and it may need to be revised to capture more specific behaviors. Overall, however, this study was designed to be a partial replication of previous studies assessing the prevalence of the “freshman 15” and therefore many of the procedures and measurement tools were utilized throughout the literature and were found to be appropriate for this purpose. This was a pilot study and it identified some interesting trends that will need to be further explored. The consequences involved in a rapid weight gain in the first year of college are too profound to be ignored in the literature, and there is hope that more concrete findings will help illuminate strategies aimed at intervening in this vulnerable population.
References


Appendix 1
Email Recruiting Message

Email Recruiting Message

Hello first year undergraduate students:

My name is Megan Phillips, and I am a graduate student in the clinical psychology doctoral program at Pacific University. I am conducting a study to investigate the impact of environmental and social aspects of the college environment on health behaviors such as diet and exercise in college freshmen. I am looking for freshmen who can complete my survey materials at three separate times occurring in September, November, and May. I will also collect height and weight measurements, and all data collected will remain completely anonymous and confidential. Your participation will take approximately 45 minutes to complete, and you may be eligible to receive extra credit/course credit from your instructor for your involvement in my study. (Please contact your professor to determine your eligibility for course/extra credit.) You can also be eligible to win a $100 gift card to Target if you complete all three measurement times! With permission from your professors, I will make an appearance in your class to provide you with further information regarding data collection dates, times, and locations. I will be emailing you again within one week of the first phase of assessment to inform you of the date, times, and location that I will be collecting data. Thank you in advance for your participation.

Megan Phillips
Graduate Student
Pacific University
Schu4049@pacificu.edu
Appendix 2
Demographic Information

Name ___________________________

Last four digits of Student ID # __________

Sex: M F

Date: __________

DOB: __________  Height__________  Weight__________

Ethnicity ___________________________

Academics
Year in school (freshman, sophomore, etc.)_______________________

Contact Information

Because this is a longitudinal investigation, this information will be used to remind you of future times to come in.

Preferred email address ___________________________

*PLEASE NOTE: Your email address will be used to contact you and inform you of future data collection dates. It will also be linked to your randomly generated number so that your data can be paired up across the different measurement dates. Your personal information will remain completely confidential and will not be associated with your data in any way.
### Appendix 3
3 Day Food Recall
**Day 1**

Day of the week: _______________________  Calendar Day: _______________________

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<thead>
<tr>
<th>Time</th>
<th>Food</th>
<th>Amount</th>
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</thead>
<tbody>
<tr>
<td>Breakfast</td>
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</tr>
<tr>
<td>Mid-Morning Snack</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lunch</td>
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<tr>
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<tr>
<td>Afternoon Snack</td>
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<td></td>
</tr>
<tr>
<td>Dinner</td>
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<tr>
<td>Night-time Snack</td>
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</table>
## Day 2

Day of the week: _______________________  Calendar Day: _______________________

### Breakfast

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### Mid-Morning Snack

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### Lunch

<table>
<thead>
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<th>Food</th>
<th>Amount</th>
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</thead>
<tbody>
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### Afternoon Snack

<table>
<thead>
<tr>
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<th>Amount</th>
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</thead>
<tbody>
<tr>
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<td></td>
</tr>
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</table>

### Dinner

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>
### Day 3 (Saturday)

Calendar Day: ________________

#### Breakfast

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<tr>
<th>Food</th>
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#### Mid-Morning Snack

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#### Lunch

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#### Afternoon Snack

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Dinner
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<th>Night-time Snack</th>
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### Godin Leisure-Time Exercise Questionnaire

1. During a typical 7-Day period (a week), how many times on the average do you do the following kinds of exercise for more than 15 minutes during your free time (write on each line the appropriate number).

<table>
<thead>
<tr>
<th>Times Per Week</th>
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<tbody>
<tr>
<td>a) STRENUOUS EXERCISE</td>
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<tr>
<td>(HEART BEATS RAPIDLY)</td>
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<tr>
<td>(e.g., running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling)</td>
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<table>
<thead>
<tr>
<th>Times Per Week</th>
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<tr>
<td>b) MODERATE EXERCISE</td>
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<td>(NOT EXHAUSTING)</td>
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<td>(e.g., fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing)</td>
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<table>
<thead>
<tr>
<th>Times Per Week</th>
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<tr>
<td>c) MILD EXERCISE</td>
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<tr>
<td>(MINIMAL EFFORT)</td>
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<tr>
<td>(e.g., yoga, archery, fishing from river bank, bowling, horseshoes, golf, snow-mobiling, easy walking)</td>
</tr>
</tbody>
</table>

2. During a typical 7-Day period (a week), in your leisure time, how often do you engage in any regular activity long enough to work up a sweat (heart beats rapidly)?

<table>
<thead>
<tr>
<th>Often</th>
<th>Sometimes</th>
<th>Rarely/Never</th>
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<td>______</td>
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### Appendix 5

**Multidimensional Health Locus of Control**

Instructions: Each item below is a belief statement about your health with which you may agree or disagree. Beside each statement is a scale which ranges from strongly disagree (1) to strongly agree (6). For each item we would like you to circle the number that represents the extent to which you agree or disagree with that statement. The more you agree with a statement, the higher will be the number you circle. The more you disagree with a statement, the lower will be the number you circle. Please make sure that you answer **EVERY ITEM** and that you circle **ONLY ONE number per item**. This is a measure of your personal beliefs; obviously, there are no right or wrong answers.

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<tr>
<th></th>
<th>SD</th>
<th>MD</th>
<th>D</th>
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(1=STRONGLY DISAGREE (SD)  
2=MODERATELY DISAGREE (MD)  
3=SLIGHTLY DISAGREE (D)  
4=SLIGHTLY AGREE (A)  
5=MODERATELY AGREE (MA)  
6=STRONGLY AGREE (SA))
Appendix 6
2009 State and Local Youth Risk Behavior Survey

This part of the survey is about your health behavior. The answers that you give will be kept private. Answer the questions based on what you really do. Please read every question carefully and circle the best answer.

If you do not feel comfortable answering a question, just leave it blank. Thank you.

1. What is your sex?
   a. Male
   b. Female

The next four questions ask about your safety

2. When you rode a bicycle in the past 12 months, how often did you wear a helmet?
   a. I did not ride a bicycle during the past 12 months
   b. Never wore a helmet
   c. Rarely wore a helmet
   d. Sometimes wore a helmet
   e. Most of the time wore a helmet
   f. Always wore a helmet

3. How often do you wear a seatbelt when riding in a car driven by someone else?
   a. Never
   b. Rarely
   c. Sometimes
   d. Most of the time
   e. Always

4. During the past 30 days, how many times did you ride in a car or other vehicle driven by someone who had been drinking alcohol?
   a. 0 times
   b. 1 time
   c. 2 or 3 times
   d. 4 or 5 times
   e. 6 or more times
5. During the past 30 days, how many times did you drive a car or other vehicle when you had been drinking alcohol?

   a. 0 times
   b. 1 time
   c. 2 or 3 times
   d. 4 or 5 times
   e. 6 or more times

The next seven questions ask about violence-related behaviors.

6. During the past 30 days, how many days did you carry a weapon such as a gun, a knife, or a club?

   a. 0 days
   b. 1 day
   c. 2 or 3 days
   d. 4 or 5 days
   e. 6 or more days

7. During the past 30 days, on how many days did you carry a gun?

   a. 0 days
   b. 1 day
   c. 2 or 3 days
   d. 4 or 5 days
   e. 6 or more days

8. During the past 30 days, on how many days did you carry a weapon such as a gun, knife, or club on school property?

   a. 0 days
   b. 1 day
   c. 2 or 3 days
   d. 4 or 5 days
   e. 6 or more days

9. During the past 12 months, how many times were you in a physical fight?

   a. 0 times
   b. 1 time
   c. 2 or 3 times
   d. 4 or 5 times
   e. 6 or more times
10. During the past 12 months, how many times were you in a physical fight in which you were injured and had to be treated by a doctor or nurse?

a. 0 times
b. 1 time
c. 2 or 3 times
d. 4 or 5 times
e. 6 or more times

11. During the past 12 months, did your boyfriend or girlfriend ever hit, slap, or physically hurt you on purpose?

a. Yes
b. No

12. Have you ever been forced to have physical intercourse when you did not want to?

a. Yes
b. No

**The next eight questions ask about tobacco use**

13. Do you smoke?

a. Yes
b. No

14. How old were you when you smoked a cigarette for the first time?

a. I have never smoked a cigarette
b. 8 years old or younger
c. 9 or 10 years old
d. 11 or 12 years old
e. 13 or 14 years old
f. 15 or 16 years old
g. 17 years or older

15. During the past 30 days, on how many days did you smoke a cigarette?

a. 0 days
b. 1 or 2 days
c. 3 to 5 days
d. 6 to 9 days
e. 10 to 19 days
f. 20 to 29 days
g. All 30 days
16. During the past 30 days, on the days that you smoked, how many cigarettes did you smoke per day?

   a. I did not smoke cigarettes during the past 30 days
   b. Less than one cigarette per day
   c. 1 cigarette per day
   d. 2 to 5 cigarettes per day
   e. 6 to 10 cigarettes per day
   f. 11 to 20 cigarettes per day
   g. More than 20 cigarettes per day

17. During the past 30 days, how did you usually get your own cigarettes? Select only one response.

   a. I did not smoke cigarettes during the past 30 days
   b. I bought them at a store
   c. I bought them from a vending machine
   d. I gave someone else money to buy them for me
   e. I borrowed them from someone else
   f. I took them from someone
   g. I got them some other way

18. During the past 12 months, did you ever try to quit smoking cigarettes?

   a. I did not smoke during the past 12 months
   b. Yes
   c. No

19. During the past 30 days, on how many days did you use chewing tobacco?

   a. 0 days
   b. 1 or 2 days
   c. 3 to 5 days
   d. 6 to 9 days
   e. 10 to 19 days
   f. 20 to 29 days
   g. All 30 days

20. During the past 30 days, on how many days did you smoke cigars?

   a. 0 days
   b. 1 or 2 days
   c. 3 to 5 days
   d. 6 to 9 days
   e. 10 to 19 days
f. 20 to 29 days  
g. All 30 days

The next five questions ask about drinking alcohol. This includes drinking beer, wine, wine coolers, and liquor such as rum, gin, vodka, or whiskey. For these questions, drinking alcohol does not include drinking a few sips of wine for religious purposes.

21. During the past 30 days, on how many days did you have at least one drink of alcohol?  
   a. 0 days  
   b. 1 or 2 days  
   c. 3 to 5 days  
   d. 6 to 9 days  
   e. 10 to 19 days  
   f. 20 to 29 days  
   g. All 30 days

22. How old were you when you had your first drink of alcohol other than a few sips?  
   a. I have never had a drink of alcohol other than a few sips.  
   b. 8 years old or younger  
   c. 9 or 10 years old  
   d. 11 or 12 years old  
   e. 13 or 14 years old  
   f. 15 or 16 years old  
   g. 17 years or older

23. During the past 30 days, on how many days did you have 5 or more drinks of alcohol within a couple of hours?  
   a. 0 days  
   b. 1 day  
   c. 2 days  
   d. 3 to 5 days  
   e. 6 to 9 days  
   f. 10 to 19 days  
   g. 20 or more days

24. During the past 30 days, how did you usually get the alcohol you drank?  
   a. I did not drink alcohol during the past 30 days  
   b. I bought it at a store  
   c. I bought it at a restaurant, bar, or club
d. I bought it at a public event such as a concert or sporting event  
e. I gave someone else money to buy it for me  
f. Someone gave it to me  
g. I took it from a store or family member  
h. I got it some other way  

25. During the past 30 days, on how many days did you have at least one drink of alcohol on school property?  

a. 0 days  
b. 1 or 2 days  
c. 3 to 5 days  
d. 6 to 9 days  
e. 10 to 19 days  
f. 20 to 29 days  
g. All 30 days  

The next three questions ask about marijuana use. Marijuana is also called grass or pot.  

26. During the past 30 days, how many times did you use marijuana?  

a. 0 times  
b. 1 or 2 times  
c. 3 to 9 times  
d. 10 to 19 times  
e. 20 to 39 times  
f. 40 or more times  

27. How old were you when you tried marijuana for the first time?  

a. I have never tried marijuana  
b. 8 years old or younger  
c. 9 or 10 years old  
d. 11 or 12 years old  
e. 13 or 14 years old  
f. 15 or 16 years old  
g. 17 years or older  

28. During the past 30 days, how many times did you use marijuana on school property?  

a. 0 times  
b. 1 or 2 times  
c. 3 to 9 times  
d. 10 to 19 times  
e. 20 to 39 times
f. 40 or more times

The next eight questions ask about other drugs.

29. During your life, how many times have you used any form of cocaine, including powder, crack, or freebase?
   a. 0 times
   b. 1 or 2 times
   c. 3 to 9 times
   d. 10 to 19 times
   e. 20 to 39 times
   f. 40 or more times

30. During the past 30 days, how many times did you use any form of cocaine, including powder, crack, or freebase?
   a. 0 times
   b. 1 or 2 times
   c. 3 to 9 times
   d. 10 to 19 times
   e. 20 to 39 times
   f. 40 or more times

31. During your life, how many times have you sniffed glue, breathed the contents of aerosol spray cans, or inhaled any paints or sprays to get high?
   a. 0 times
   b. 1 or 2 times
   c. 3 to 9 times
   d. 10 to 19 times
   e. 20 to 39 times
   f. 40 or more times

32. During your life, how many times have you used heroin (also called smack, junk, or China White)?
   a. 0 times
   b. 1 or 2 times
   c. 3 to 9 times
   d. 10 to 19 times
   e. 20 to 39 times
   f. 40 or more times

33. During your life, how many times have you used methamphetamines (also called speed, crank, crystal, or ice)?
a. 0 times
b. 1 or 2 times
c. 3 to 9 times
d. 10 to 19 times
e. 20 to 39 times
f. 40 or more times

34. During your life, how many times have you used ecstasy (also called MDMA)?

a. 0 times
b. 1 or 2 times
c. 3 to 9 times
d. 10 to 19 times
e. 20 to 39 times
f. 40 or more times

35. During your life, how many times have you taken steroid pills or shots without a doctor’s prescription?

a. 0 times
b. 1 or 2 times
c. 3 to 9 times
d. 10 to 19 times
e. 20 to 39 times
f. 40 or more times

36. During your life, how many times have you used a needle to inject any illegal drug into your body?

a. 0 times
b. 1 time
c. 2 or more times

The next seven questions ask about sexual behavior

37. Have you ever had sexual intercourse?

a. Yes
b. No

38. How old were you when you had sexual intercourse for the first time?

a. I have never had sexual intercourse
b. 11 years or younger
c. 12 years old
d. 13 years old
e. 14 years old
f. 15 years old
g. 16 years old
h. 17 years or older

39. During your life, how many people have you had sexual intercourse with?
   a. I have never had sexual intercourse
   b. 1 person
c. 2 people
d. 3 people
e. 4 people
f. 5 people
g. 6 or more people

40. During the past 3 months, how many people have you had sexual intercourse with?
   a. I have never had sexual intercourse
   b. I have had sexual intercourse but not during the past 3 months.
c. 1 person
d. 2 people
e. 3 people
f. 4 people
g. 5 people
h. 6 or more people

41. Did you drink alcohol or use drugs before you had sexual intercourse the last time?
   a. I have never had sexual intercourse
   b. Yes
c. No

42. The last time you had sexual intercourse, did you or your partner use a condom?
   a. I have never had sexual intercourse
   b. Yes
c. No

43. The last time you had sexual intercourse, what one method did you or your partner use to prevent pregnancy? Select only one response.
   a. I have never had sexual intercourse
   b. No method was used to prevent pregnancy
c. Birth control pills
d. Condoms
e. Depo-Provera (injectable birth control)
f. Withdrawal
g. Some other method
h. Not sure

The next seven questions ask about body weight.

44. How do you describe your weight?
   a. Very underweight
   b. Slightly underweight
   c. About the right weight
   d. Slightly overweight
   e. Very overweight

45. Which one of the following are you trying to do about your weight?
   a. Lose weight
   b. Gain weight
   c. Stay the same weight
   d. I am not trying to do anything about my weight

46. During the past 30 days, did you exercise to lose weight or keep from gaining weight?
   a. Yes
   b. No

47. During the past 30 days did you eat less food, fewer calories, or foods low in fat to lose weight or keep from gaining weight?
   a. Yes
   b. No

48. During the past 30 days, did you go without eating for 24 hours or more (also called fasting) to lose weight or keep from gaining weight?
   a. Yes
   b. No

49. During the past 30 days, did you take any diet pills, powders, or liquids without a doctor’s advice to lose weight or keep from gaining weight (Do not include meal replacement products such as Slim Fast)?
   a. Yes
   b. No
50. During the past 30 days, did you vomit or take laxatives to lose weight or keep from gaining weight?

   a. Yes  
   b. No  

The next four questions ask about your physical activity levels.

51. During the past 7 days, how many days were you physically active for a total of at least 60 minutes per day? (Add up all the time you spent in any kind of physical activity that increased your heart rate and made you breathe hard some of the time).

   a. 0 days  
   b. 1 day  
   c. 2 days  
   d. 3 days  
   e. 4 days  
   f. 5 days  
   g. 6 days  
   h. 7 days  

52. On an average school day, how many times do you watch TV?

   a. I do not watch TV on an average school day.  
   b. Less than one hour per day  
   c. 1 hour per day  
   d. 2 hours per day  
   e. 3 hours per day  
   f. 4 hours per day  
   g. 5 or more hours per day  

53. On an average school day, how many hours do you play video or computer games or use a computer for something that is not school work? (Include activities such as Nintendo, Game Boy, Play Station, Xbox, computer games, and the Internet).

   a. I do not play video or computer games or use a computer for something that is not school work.  
   b. Less than one hour per day  
   c. 1 hour per day  
   d. 2 hours per day  
   e. 3 hours per day  
   f. 4 hours per day  
   g. 5 or more hours per day
54. During the past 12 months, on how many sports teams did you play? (Include any teams run by your school or community groups).

a. 0 teams  
b. 1 team  
c. 2 teams  
d. 3 or more teams  

This is the end of the survey. Thank you very much for your participation.
### Appendix 7

#### Three-Factor Eating Questionnaire

**Directions:** These are some questions about how people may react around food. Please circle true or false for each item that best applies to you. Thank you.

### Part I

1. When I smell a sizzling steak or see a juicy piece of meat, I find it very difficult to keep from eating, even if I have just finished a meal. 
   - T
   - F

2. I usually eat too much at social occasions, like parties and picnics. 
   - T
   - F

3. I am usually so hungry that I eat more than three meals a day. 
   - T
   - F

4. When I have eaten my quota of calories, I am usually good about not eating anymore. 
   - T
   - F

5. Dieting is so hard for me because I just get too hungry. 
   - T
   - F

6. I deliberately take small helpings as a means of controlling my weight. 
   - T
   - F

7. Sometimes things just taste so good that I keep on eating even when I am no longer hungry. 
   - T
   - F

8. Since I am often hungry, I sometimes wish that while I am eating, an expert would tell me that I have had enough or that I can have something more to eat. 
   - T
   - F

9. When I feel anxious, I find myself eating. 
   - T
   - F

10. Life is too short to worry about dieting. 
    - T
    - F

11. Since my weight goes up and down, I have gone on reducing diets more than once. 
    - T
    - F

12. I often feel so hungry that I just have to eat something. 
    - T
    - F

13. When I am with someone who is overeating, I usually overeat too. 
    - T
    - F

14. I have a pretty good idea of the number of calories in common food. 
    - T
    - F

15. Sometimes when I start eating, I just can't seem to stop. 
    - T
    - F

16. It is not difficult for me to leave something on my plate. 
    - T
    - F
17. At certain times of the day, I get hungry because I have gotten used to eating then. T F

18. While on a diet, if I eat food that is not allowed, I consciously eat less for a period of time to make up for it. T F

19. Being with someone who is eating often makes me hungry to eat also. T F

20. When I feel blue, I often overeat. T F

21. I enjoy eating too much to spoil it by counting calories or watching my weight. T F

22. When I see a real delicacy, I often get so hungry that I have to eat right away. T F

23. I often stop eating when I am not really full as a conscious means of limiting the amount that I eat T F

24. I get so hungry that my stomach often seems like a bottomless pit. T F

25. My weight has hardly changed at all in the last ten years. T F

26. I am always hungry so it is hard for me to stop eating before I finish the food on my plate T F

27. When I feel lonely, I console myself by eating. T F

28. I consciously hold back at meals in order not to gain weight. T F

29. I sometimes get very hungry late in the evening or at night. T F

30. I eat anything I want, any time I want. T F

31. Without even thinking about it, I take a long time to eat. T F

32. I count calories as a conscious means of controlling my weight. T F

33. I do not eat some foods because they make me fat. T F

34. I am always hungry enough to eat at any time. T F

35. I pay a great deal of attention to changes in my figure. T F

36. While on a diet, if I eat a food that is not allowed, I often splurge
and eat other high calorie foods.

T  F

**Part II**

**Directions:** Please answer the following questions by circling the number above the response that is appropriate to you.

37. How often are you dieting in a conscious effort to control your weight?

   1  rarely       2  sometime     3  usually     4  always

38. Would a weight fluctuation of 5 lbs. affect the way you live your life?

   1  rarely       2  sometime     3  usually     4  always

39. How often do you feel hungry?

   1  rarely       2  sometime     3  usually     4  always

40. Do your feelings of guilt about overeating help you to control your food intake?

   1  rarely       2  sometime     3  usually     4  always

41. How difficult would it be for you to stop eating halfway through dinner and not eat for the next four hours?

   1  easy         2  slightly difficult 3  moderately difficult 4  very difficult

42. How conscious are you of what you are eating?

   1  easy         2  slightly     3  moderately   4  extremely

43. How frequently do you avoid "stocking up" on tempting food?

   1  almost never  2  seldom       3  usually    4  almost always
44. How likely are you to shop for low calorie foods?

1 unlikely
2 slightly unlikely
3 moderately likely
4 very likely

45. Do you eat sensibly in front of others and splurge alone?

1 never
2 rarely
3 often
4 always

46. How likely are you to consciously eat slowly in order to cut down on how much you eat?

1 unlikely
2 slightly unlikely
3 moderately likely
4 very likely

47. How frequently do you skip dessert because you are no longer hungry?

1 almost never
2 seldom
3 usually
4 almost always

48. How likely are you to consciously eat less than you want?

1 unlikely
2 slightly unlikely
3 moderately likely
4 very likely

49. Do you go on eating binges though you are not hungry?

1 never
2 rarely
3 often
4 always

50. On a scale of 0 to 5, where 0 means no restraint in eating (eating whatever you want, whenever you want it) and 5 means total restraint (constantly limiting food intake and never "giving in"), what number would you give yourself?

0 eating whatever you want, whenever you want it
1 usually eat whatever you want, whenever you want it
often eat whatever you want, whenever you want it

often limit food intake, but often "give-in"

usually limit food intake, rarely "give-in"

constantly limiting food intake, never "giving-in"

51. To what extent does this statement describe your eating behavior?
"I start dieting in the morning, but because of any number of things that happen during the day, by evening I have given up and eat what I want, promising myself to start dieting again tomorrow."

1 not like me  
2 little like me  
3 pretty good  
4 perfectly describes me
Appendix 8
Measure of Physical Environment

The following are questions about your school environment. Please circle the best answer.

1. Do you live on campus?
   Yes   No

2. If you do not live on campus, how do you commute to school?
   a. Drive
   b. walk
   c. carpool
   d. bike
   e. public transportation (i.e. bus, max, etc.)

3. If you live on campus, do you have a meal plan?
   Yes   No

4. Are you aware that your meal plan allows you to choose between a number of different eating establishments on campus?
   Yes   No

5. If Yes, how often do you eat at the school cafeteria?
   a. Always
   b. Very Often
   c. Sometimes
   d. Rarely
   e. Never

6. How often do you eat at other restaurants available to you on campus (i.e. school affiliated coffee, sandwich, and burger shops)?
   a. Always
   b. Very Often
   c. Sometimes
   d. Rarely
   e. Never

7. Are you aware that your school cafeteria offers a variety of fresh fruits and vegetables?
8. If yes, how often do you eat fruits and vegetables with your meal?
   a. Always
   b. Very Often
   c. Sometimes
   d. Rarely
   e. Never

9. Are you aware that your school offers vegan and vegetarian meal options?
   Yes   No

10. If yes, how often do you eat vegan or vegetarian meals?
    a. Always
    b. Very Often
    c. Sometimes
    d. Rarely
    e. Never

11. Are you aware that your school has a fitness center for student use?
    Yes   No

12. If yes, how often do you use the fitness center?
    a. Always
    b. Very Often
    c. Sometimes
    d. Rarely
    e. Never

13. Are you aware that your school is located near several public parks that offer hiking, biking, and walking trails?
    Yes   No

14. If yes, how often do you go to any of these parks?
    a. Always
    b. Very Often
c. Sometimes
d. Rarely
e. Never

15. Did you know that your school offers outdoor adventure activities such as hiking, backpacking, and river rafting trips throughout the year?

Yes           No

16. If yes, how often do you participate in these activities?

   a. Always
   b. Very Often
   c. Sometimes
   d. Rarely
   e. Never

17. Did you know that your school offers intramural sports teams and clubs such as basketball, soccer, and tennis for students?

Yes           No

18. If yes, how often do you participate in these activities?

   a. Always
   b. Very Often
   c. Sometimes
   d. Rarely
   e. Never